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September 28, 2018

**VIA ELECTRONIC FILING**
Jocelyn Boyd, Esquire
Chief Clerk and Administrator
South Carolina Public Service Commission
101 Executive Center Drive
Columbia, SC 29210

RE: Application of Carolina Water Service, Inc. for Adjustment of Rates and Charges and Modifications to Certain Terms and Conditions for the Provision of Water and Sewer Service
Docket No. 2017-292-WS

Dear Ms. Boyd:

Enclosed please find for filing the Forty Love Point Engineering Assessment on behalf of Carolina Water Service, Inc. in the above-referenced docket. By copy of this letter, I am serving all parties of record.

If you have any questions or if I may provide you with any additional information, please do not hesitate to contact me.

Sincerely,

Elliott & Elliott, P.A.

Scott Elliott

SE/lbk
Enclosures
cc: All parties of record w/enc.

**BEFORE**

**THE PUBLIC SERVICE COMMISSION OF**

**SOUTH CAROLINA**

**DOCKET NO. 2017-292-WS**

**Carolina Water Service, Inc.**
**Compliance Filing**
**Forty Love Point Engineering Assessment**

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On May 30, 2018, the South Carolina Public Service Commission (the "Commission" or "PSC") approved Carolina Water Service, Inc.'s ("CWS" or the "Company") request for an increase in general rates and charges for its water and sewer services. As part of its Order, the PSC provided that:

> "CWS will continue to communicate the engineering assessment with the outside contractor with Forty Love. CWS and Forty Love have agreed to report their findings to the Commission and ORS in six months – by September 30, 2018. Id. The Commission finds that the agreement between CWS and Forty Love is reasonable."

The following report provides the Commission with an engineering assessment completed by Goodwyn, Mills, and Cawood, Inc. that provides further information concerning the Forty Love Point system.

# TECHNICAL MEMORANDUM

## Forty Love Point Subdivision Sewer System Study

Prepared for:
Carolina Water Service

Carolina Water Service, Inc.

Prepared By:

GMC

Goodwyn, Mills and Cawood, Inc.
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**GMC PROJECT NUMBER:** CGRE180022

SOUTH CAROLINA
GOODWYN, MILLS & CAWOOD, INC.
No. 0339
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 35534
ESLEY JOSEPH
9/27/18

## Introduction

In response to on-going sewer system issues at the Forty Love Point Subdivision in Chapin, SC, Carolina Water Service (CWS) has retained Goodwyn, Mills & Cawood (GMC) to evaluate the existing sewer system and recommend improvements to alleviate the current issues, as well as improve overall system operation. The objective of this memorandum is to provide the findings from the following three (3) tasks associated with this study, as defined in Task Order 18-03 – Forty Love Point Study:

1. Assessment and Evaluation of Existing System
2. Development of a Short-Term Recommendation
3. Development of a Long-Term Recommendation

## Background

The Forty Love Point Subdivision is a community that is located along Lake Murray in Chapin, SC. Its water and sewer systems are owned and operated by CWS. Regarding the sewer system, a significant number of complaints have been filed with CWS and the South Carolina Department of Health and Environmental Control (DHEC). These complaints state that, during rain events, sewage would back up into the homes of the residents and create unsanitary living conditions. Table 1 lists the incidents that have been reported, along with the locations where the sewage backups occurred:

Table 1: Reported Sewer System Complaints

| Date | Location | Received By | Incident # |
|---|---|---|---|
| December 24, 2014 | 105 Forty Love Point<br>136 Forty Love Point | CWS | |
| January 12, 2015 | 105 Forty Love Point | CWS | |
| October 2015 | 105 Forty Love Point | CWS | |
| September 14, 2016 | 105 Forty Love Point | DHEC | 201604728 |
| October 2016 | 105 Forty Love Point | DHEC | |
| January 2, 2017 | 105 Forty Love Point | DHEC | |
| September 11, 2017 | 105 Forty Love Point | DHEC | |
| January 28, 2018 | 105 Forty Love Point<br>132 Forty Love Point | DHEC | 201800726 |
| May 25, 2018 | 105 Forty Love Point<br>132 Forty Love Point<br>6 Set Point Court | DHEC | 201802659 |

CWS has attempted to address these sewer system issues in a variety of ways. In February of 2017, CWS contracted Carolina Lift Stations to perform smoke testing throughout the subdivision. CWS has also performed various additional tasks in an attempt to address the system's operational challenges, including the following:

- Repairs to cleanouts and other sewer service issues in response to smoke testing results
- Chemical cleaning of various portions of the sewer system
- Cleaning of septic tanks at homes throughout the subdivision

Despite these actions, the system issues persisted. Therefore, to alleviate the current issues with the sewer system, CWS has on-call service agreements with Livingston and Varn, along with Spicer On-Call Services, to pump and haul sewage during rain events. This manner of operating the system is costly, unsustainable, and undesirable. To fully address these issues, CWS has contracted Goodwyn, Mills, and Cawood (GMC) to evaluate the current sewer system and develop a short-term recommendation for the affected homes, as well as a long-term solution that will ensure reliable sewer system operations and uninterrupted sewer service for the homeowners.

## Task 1: Assessment/Evaluation of the Existing System

*Overview of Sewer System at Forty Love Point*

The sewer system at Forty Love Point was installed in 1987, when the initial phase of the subdivision was built. This sewer system is a LETTS system, which consists of dual-chamber septic tanks at each residence that is designed to separate solid and liquid waste and is connected to a main perimeter sewer line that collects all of the liquid waste from the homes, as shown in Figure 1.

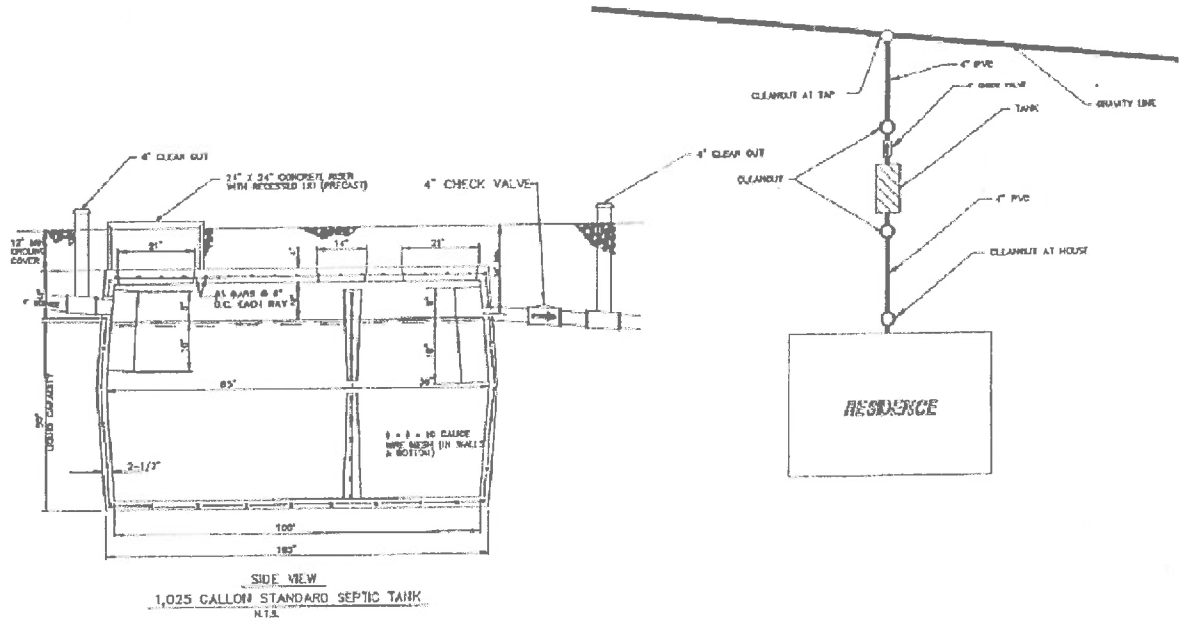


*Figure 1: Details of LETTS septic tanks*

While the solids are removed from the tanks by an outside septic service contractor, the liquid waste from each home flows by gravity into a main 6" PVC sewer line that runs along the shoreline of Lake Murray. The main sewer line discharges into the Hiller Rd. Lift Station on the north end of the subdivision. The Hiller Rd. Lift Station consists of a wet well with two (2) submersible pumps and two (2) Gorman-Rupp booster pumps, which direct the liquid waste into the Richland County force main that runs along Hiller Rd.

The LETTS system, which serves the Forty Love Point subdivision, is not a traditional gravity sewer system. No manholes are present, and cleanouts are placed throughout the system, which provide the only means of access into the system. The main sewer line that runs along Lake Murray is placed at the same elevation (357 ft. above mean sea level) throughout the subdivision. As a result, gravity is not the primary driving force for the sewage to reach the Hiller Rd. Lift Station. The main line remains full at a consistent pressure of approximately 1-1.5 psi, and thus, the liquid waste moves through the main line via displacement, i.e., as liquid waste enters the system from the homes, it displaces the existing water in the main sewer line, which then discharges into the Hiller Rd. Lift Station.

To ensure that the liquid waste discharges into the Hiller Rd. Lift Station, a recirculation system has been installed on the south end of the system. The recirculation system consists of a duplex "PDQ" station, which pumps to an automatic siphon station that is built at an elevation that is approximately 7.5 feet higher than the main sewer line. The purpose of the recirculation system is to provide additional pressure to the south end of the main line to ensure that the liquid waste moves north through the system and ultimately discharges into the Hiller Rd. Lift Station.

*Operational Challenges of the Forty Love Point Sewer System*

Based on the data made available by CWS, no operational issues exist during normal weather conditions. Challenges only appear to arise during rain events. Once the rain begins, the pressure in the main sewer line increases, and customer complaints of sewer backups are received by CWS. When reviewing the data from the incident that occurred on May 25, 2018, the following observations were made:

- Sewage backups were reported at the following homes at approximately 7:14pm:
  - 105 Forty Love Point Dr.
  - 132 Forty Love Point Dr.
  - 6 Set Point Ct.
- Pressure in the main line increased from approximately 1 psi (2.3 feet) to a maximum of 2.8 psi (6.5 feet).
- The pressure in the Richland County force main increased from its typical operating range of 30-40 psi to approximately 80 psi.
- Both pumps ran for a short period of time in the afternoon.
- No high-level alarms occurred at the Hiller Rd. Lift Station.

- No high-level alarms occurred at the pump stations associated with the recirculation system
- Approximately five (5) truckloads of liquid sewer (approximately 25,000 gallons) were pumped out of the sewer system and hauled off-site.

The data from this incident suggests that the issues related to the operation of the system stem from the inability of the liquid wastewater to get to the lift station during rain events. The lift station did not appear to be the source of the sewer backups, and the lack of high-level alarming suggests that sufficient pumping occurred during the incident. While the increased pressure in the Richland County force main caused the pumping rate in the Hiller Rd. Lift Station to decrease, no issues were present at the lift station during the incident.

*Additional Considerations*

The historical record of complaints, along with anecdotes from the homeowners, show that the sewage backups that occur during rain events are always reported by the same three (3) homes that were previously-identified. After visiting these homes on several occasions, they appear to share the following characteristics that make them more susceptible to system failure:

- **Finished basements.** Each home has a finished basement with sewer service. With these finished basements, the outgoing sewer service from the home must be installed at a lower elevation, which reduces the slope that is available at the connection to the septic tank and the main line.

- **Proximity to the main sewer line.** These homes appear to be the closest to the main line as it runs along the shoreline of the lake. As a result, the service lines that are connected to the main line are shorter, which results in less storage volume in the event of a sewer backup.

- **Influence of gravity flow from interior homes.** The homeowners have stated that sewer backups did not occur in their homes when they were initially purchased. However, as the interior lots were developed and inhabited, problems began to arise with their sewer service. With the interior homes at a higher elevation than the homes along the lake, increased pressure during rain events from the sewer lines that serve those homes may contribute to the issues that have been identified.

Since the installation of the sewer system, no history of maintenance repairs on the main line or other piping was found. When considering the condition of the piping, no CCTV or sewer inspection data was available. Therefore, traditional causes of sewer backups (e.g., solids buildup, grease deposits, damaged pipe, sags, etc.) cannot be ruled out.

## Task 2: Development of a Short-Term Recommendation

The purpose of the short-term recommendation is to alleviate the sewer backup issues that occur at the three (3) affected homes during rain events and to provide CWS operators with improved notifications of pending rain events. The short-term recommendation is not intended to be a complete solution for the entire sewer system.

The following short-term projects are recommended for the sewer system to address its immediate issues:

1. **Installation of rain gauges.** With the issues consistently occurring during rain events, rain gauges with alarming capabilities would enable the operators to respond more quickly to prevent the occurrence of sewer backups. The recommended placement of the rain gauges is at the "PDQ" station, where the pump-and-haul activities occur during rain events.

2. **Installation of small pumps and force main at affected homes.** To prevent sewer backups from occurring in the homes, small, submersible pumps are recommended for the septic tanks, along with a small force main to re-route the liquid wastewater from the homes. The pumps are recommended to be placed in the liquid section of the septic tank to pump during peak flow and rain events, along with check valves on the effluent line of the tanks to prevent sewer backups. The force main is recommended to be routed through the yards of the homes and connected to the nearest sewer line along the road. This configuration would provide maximum separation of the home from the main line along the lake.

Tables 2 and 3 provide an estimated cost and schedule for the recommended short-term projects.

*Table 2: Estimated Cost for Short-Term Projects*

| **Project 1: Installation of rain gauges*** | | | | | |
|---|---|---|---|---|---|
| **Project 2: Installation of pump and force main at affected homes** | | | | | |
| **Item** | **Qty.** | **Unit** | **Description** | **Unit Price** | **Total** |
| 1 | 3 | EA | 1-hp Residential Grinder Pumps (including control panel, valving, and appurtenances) | $7,000 | $21,000 |
| 2 | 1,220 | LF | 1.5" PVC Sewer Service (including bends and fittings) | $12 | $14,640 |
| 3 | 3 | LS | Connect to Existing Sewer | $500 | $1,500 |
| 4 | 1 | LS | Electrical Allowance | $8,500 | $8,500 |
| | | | | **Construction Subtotal** | $45,640 |
| | | | | Contingency (20%) | $9,130 |
| | | | | **CONSTRUCTION TOTAL**** | **$54,770** |

***This project was performed in-house by CWS. Therefore, the cost was not included in this estimate.***

****This cost estimate does not include additional services associated with the project, such as surveying, engineering, and permitting, along with construction administration and inspection.***

*Table 3: Estimated Schedule for Short-Term Projects*

| Project | Estimated Completion Date | Status |
|---|---|---|
| Installation of rain gauges | July 2018 | COMPLETE |
| Installation of pump and force main at affected homes | September 2018 | UNDER CONSTRUCTION |

**Task 3: Development of a Long-Term Recommendation**

The purpose of the long-term recommendation is to improve the overall operation of the system and eliminate the need for CWS operators to employ pump-and-haul activities during rain events and fully resolve the issues at the individual homes.

The recommended long-term solution is the installation of a pump station on the south end of the system to remove additional wastewater from the system during peak flow and rain events. This pump station would function in a manner that resembles the current pump-and-haul activities that take place. The recommended pump station would remove wastewater from the system and convey it along the road to the Hiller Rd. Lift Station via a 2" force main. This pump station is proposed to operate during peak flow conditions and rain events.

Table 4 provides an estimated cost for the recommended long-term solution.

*Table 4: Estimated Cost for Long-Term Solution*

| Item | Qty. | Unit | Description | Unit Price | Total |
|---|---|---|---|---|---|
| 1 | 1 | EA | Pre-fabricated Fiberglass Pump Station (including control panel, valves, and appurtenances) | $60,000 | $60,000 |
| 2 | 4,800 | LF | 2" PVC Sewer Force Main (including bends and fittings) | $15 | $72,000 |
| 3 | 1 | LS | Connect to Existing Lift Station | $1,500 | $1,500 |
| 4 | 1 | LS | Electrical Allowance | $5,000 | $5,000 |
| | | | **Construction Subtotal** | | **$138,500** |
| | | | Contingency (20%) | | $27,700 |
| | | | **CONSTRUCTION TOTAL*** | | **$166,200** |

***This cost estimate does not include additional services associated with the project, such as surveying, engineering, and permitting, along with construction administration and inspection.***

The design of the long-term project is currently underway, and the estimated completion date is January 2019.

**Continued Operations and Maintenance**

Along with the implementation of the short-term and long-term recommendations for the Forty Love Point sewer system, it is important to perform routine maintenance and inspections to ensure that the operators have the best available information and to plan future improvements for the system. Currently, no information is available on the condition of the sewer piping, the residential septic tanks and check valves, or the performance of the main sewer line along the lake. To ensure that the sewer system is operating as designed and to provide data to the CWS staff, the following tasks are recommended to be performed:

- Routine cleaning and maintenance of residential septic tanks and valving
- Cleaning and CCTV inspection of main sewer line along the lake
- Locating and repairing (if necessary) all cleanouts throughout the sewer system
- Improved flow monitoring at the Hiller Rd. Lift Station
- Eliminating any direct sewer service connections from the homes to the main sewer line, which would contribute to solids buildup in the sewer system

These tasks can be performed by CWS staff or their subcontractors, and the data that would be obtained is critical to optimizing the operation of the system.

# CERTIFICATE OF SERVICE

The undersigned employee of Elliott & Elliott, P.A. does hereby certify that she has served below listed parties with a copy of the pleading(s) indicated below by mailing a copy of same to them in the United States mail, by regular mail, with sufficient postage affixed thereto and return address clearly marked on the date indicated below:

RE: Application of Carolina Water Service, Inc. for Adjustment of Rates and Charges and Modifications to Certain Terms and Conditions for the Provision of Water and Sewer Service
Docket No. 2017-292-WS

PARTIES SERVED:

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PLEADINGS: FORTY LOVE POINT ENGINEERING ASSESSMENT

September 28, 2018

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